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Health-Related Quality of Life in People Living with Psychotic Illness, and Factors Associated with Its Variation

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ABSTRACT

Objectives: To establish whether the four-dimensional Assessment of Quality of Life (AQoL-4D) produces robust utility values in adults with psychotic illness, and identify health inequalities compared with the general population. **Methods:** The AQoL-4D was completed by 1613 individuals with an *International Classification of Diseases, Tenth Revision*, psychotic illness in the 2010 Australian National Survey of Psychosis. Utilities were assessed for this sample and 20 subgroups, and were compared with general population norms. Modified Cohen *d* was used as an index of effect size. Utilities were collapsed into 10 health-related quality-of-life (HRQOL) bands or decades. **Results:** HRQOL in people with psychotic illness was half of the maximum achievable utility (half-"full health") with a mean utility of 0.49 (95% confidence interval [CI] 0.48–0.51), and showing substantial variability across subgroups. Participants with essentially normal functioning had the highest mean utility (0.72; 95% CI 0.68–0.77), and those with very poor perceived mental health had the lowest (0.22; 95% CI 0.18–0.26). These subgroups showed the most variability. Negative symptoms also gave rise to substantial variation. Among diagnostic categories, only depressive psychosis had a large effect relative to delusional disorders. The distribution of utilities in people with psychotic illness differed markedly from that in the general population, with 6.8% versus 47.2% having values in the highest decade (>0.90–1.00). Utilities were lower in every age group in people with psychosis. **Conclusions:** Profound HRQOL impacts are revealed by the AQoL-4D in people with psychotic illness, and marked variations in utilities were observed for key subjective and objective measures. We provide a suite of utility values for economic modeling studies and recommend the AQoL-4D for assessing HRQOL in people with psychotic illness.

Keywords: economic modeling, health inequalities, psychotic disorders, schizophrenia, utility assessment.

Introduction

Psychotic illness comprises a heterogeneous group of disorders in which an individual's understanding and experience of reality is distorted, reflected in disturbances in the formation and content of their thoughts. The impact of psychotic illness is profound with mental, physical, and social well-being affected. Currently, there is no accepted source of valid and reliable utilities to assess health-related quality-of-life (HRQOL) impacts. Commonly used multi-attribute utility instruments (MAUIs), including the EuroQol five-dimensional questionnaire (EQ-5D), the six-dimensional health state short form (SF-6D), and the 15D, are considered problematic [1–4]. Concerns raised include insensitivity (inability to detect lower HRQOL in people with psychosis) and the lack of responsiveness to disease-specific symptoms and other phenomena. This lack of unbiased instruments compromises decision making. One instrument that has not been considered in the debate of the appropriateness and usefulness of MAUIs for psychotic disorders is the four-dimensional Assessment of Quality of Life (AQoL-4D) instrument [5].

This publication is based on data collected in the framework of the 2010 Australian National Survey of High Impact Psychosis. The members of the Survey of High Impact Psychosis Study Group at that time were V. Morgan (National Project Director), A. Jablensky (Chief Scientific Advisor), A. Waterreus (National Project Coordinator), R. Bush, V. Carr, D. Castle, M. Cohen, C. Galletly, C. Harvey, B. Hocking, A. Mackinnon, P. McGorry, J. McGrath, A. Neil, S. Saw, and H. Stain.

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The AQoL-4D differs from other MAUIs (EQ-5D, 15D, and SF-6D) in several important aspects. First, the AQoL instruments are the only MAUIs constructed using psychometric principles [6], including having a minimum of three items measuring the same underlying latent construct. Second, there are major differences with respect to their descriptive systems (see Appendix 1 in Supplemental Materials found at https://doi.org/10.1016/j.jval.2018.02.012); the AQoL gives greater weight to social disability than do other instruments [7], and differences in descriptive/classification systems are the principal determinants of non-equivalence between MAUIs and the utilities they assess [8]. Finally, the AQoL-4D has good lower end sensitivity and has been validated for use in people with psychotic illness [9]. Together, these factors indicate that the AQoL-4D should have major advantages in the assessment of utilities in people with psychosis. We aimed to establish whether the AQoL-4D produces robust utility values in adults with psychotic illness, and to identify health inequalities compared with the general population.

Methods

Data for people with psychotic illness were collected as part of the 2010 Australian National Survey of Psychosis—the Survey of High Impact Psychosis [10–12], a large population-based cross-sectional survey of people with psychosis aged 18 to 64 years. The survey was undertaken at seven sites in five Australian states, and covered an estimated resident population of 1,464,923 people—about 10% of the Australian population in the age range. A two-phase design was used.

In phase 1 (March 2010), screening for individuals likely to meet diagnostic criteria for psychosis occurred in public specialized mental health services (inpatient, outpatient, ambulatory, and community mental health services) and nongovernmental organizations supporting people with mental illness. Administrative records were searched to identify individuals with psychosis who were in contact with public mental health services in the 11 months before census but not in the census month. In phase 2 (April to December 2010), 1825 of the 7955 people who were screened positive for psychosis in phase 1 were randomly selected for interview, stratified by age group (18–34 years and 35–64 years). At the interview, 1642 of this sample met *International Classification of Diseases, Tenth Revision* (*ICD-10*) criteria for a psychotic disorder.

Interview data were collected on symptomatology, substance use, disability, cognitive functioning, physical health, mental and physical health service utilization, medication use, education, employment, housing, community sector support, and HRQOL. For full methodological details, refer to the studies by Morgan et al. [10–12].

The study was approved by institutional human research ethics committees at all seven study sites. Participants gave written informed consent after receiving full information on the study.

Basic Analytic Approach

HRQOL was assessed for individuals meeting *ICD-10* criteria for a psychotic disorder across a range of 20 subjective and objective general and illness-related characteristics, and comparisons were made with relevant population norms.

Measures

The AQoL-4D

HRQOL was assessed using the AQoL-4D [5,7]. The AQoL-4D is the original of a suite of AQoL instruments (4D, 6D, 7D, and 8D) and was developed with specific reference to the World Health Organization's 1948 definition of health: "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" [5]. It comprises five health dimensions, each with three items of four levels of severity (see Appendix 1 in Supplemental Materials). Four dimensions are used in the assessment of utility: independent living, social relationships, psychological well-being, and physical senses.

With the AQoL-4D, utilities can range from −0.04, for states worse than death, to 1.00, full health (see Appendix 2 in Supplemental Materials found at https://doi.org/10.1016/j.jval.2018.02.012). Utilities were calculated using the standard algorithm provided as AQoL-4D Algorithm for SPSS (http://www.aqol.com.au/scoring-algorithms/82.html). Utilities were also collapsed into decades, 10 equally spaced bands of utility scores, except for the lowest, which was extended to accommodate states worse than death. The bands thus ranged from (−0.04 to 0.10) to (>0.90 to 1.00).

The population utilities used for comparison [13] were based on data collected in the course of the 2007 Australian National Survey of Mental Health and Wellbeing, a nationally representative, face-to-face household survey of 8841 community residents aged 16 to 85 years, undertaken by the Australian Bureau of Statistics [14].

Demographic and functioning measures

Demographic variables comprised primary homelessness (sleeping rough) in the past 12 months (yes, no), difficulty reading and/or writing (self-report: yes, no), and completed final year of schooling (yes, no). Functioning was assessed by the interviewers, who were mental health professionals trained in the use of the survey instruments. Premorbid IQ was measured using the National Adult Reading Test [15] summary scores, and categorized as above, below, or within 1 SD of the sample mean (98.0 ± 11.3). Current cognitive function was based on the Digit-Symbol Coding task summary scores from the Repeatable Battery for Assessment of Neuropsychological Status [16], and categorized as above, below, or within 1 standard deviation (SD) of the sample mean (38.3 ± 10.6). Global independent functioning was measured using the Multidimensional Scale of Independent Functioning [17] and categorized as essentially normal, very mild disability, somewhat disabled, moderately disabled, significantly disabled, extremely disabled, and totally disabled. Social functioning was rated as no dysfunction, obvious dysfunction, or severe dysfunction.

General health variables

General health variables, for which there are published Australian norms [13], included perceived mental health status and perceived physical health status (excellent, good, fair, poor, very poor), self-reported lifetime cardiovascular disease (CVD; yes, no), and self-reported current and lifetime depressive symptoms (yes, no).

Disorder-specific health variables

Disorder-specific health variables included *ICD-10* diagnosis (schizophrenia, schizoaffective disorder, bipolar disorder with psychotic features, depressive psychosis, and delusional disorders), course of illness (single episode, multiple episodes with good recovery, multiple episodes with partial recovery, continuous chronic, and continuous chronic with deterioration), duration of illness (<1 year, 1 year, 2–4 years, 5–9 years, 10–19 years, 20–29 years, and ≥30 years), current and lifetime suicidal ideation (attempted suicide or ideation present at least 1 week, present at least 2 weeks, and present at least 1 month), number of negative symptoms, and presence of current positive symptoms and/or symptoms of mania and/or depressive symptoms.

Negative symptoms were scored as the number of negative signs or symptoms, on the basis of those identified by Carpenter et al. [18] (restricted effect, diminished emotional range, poverty of speech, curbing of interest, diminished sense of purpose, and diminished social drive) and operationalized through the Schedules for Clinical Assessment in Neuropsychiatry [19]. Attribution (whether the symptoms were primary or secondary to the psychotic illness) was not taken into account. Scores ranged from 0 to 6. Positive symptoms comprised the presence of subjective thought disorder and/or delusions and/or hallucinations.

Statistical Analysis

Data were weighted to achieve representativeness of the screened positive sample, with sampling weights reflecting site and age strata of the interviewed sample. Simple descriptive statistics comprising mean and 95% confidence interval (CI), median, and interquartile range (IQR) were assessed using SPSS version 22 (SPSS Inc., Chicago, IL), the Complex Samples Descriptives procedure. The median and IQR were ascertained with reference to the cumulative frequency distribution.

The observed distribution of AQoL utilities was approximately symmetric (skewness −0.09), but platykurtic (kurtosis −1.13). Utility data were assessed untransformed.

Analyses of differences between groups within the sample were based on analysis of variance using the Pearson χ^2 test [20] and a comparison of group CIs, both assessed using the SPSS Complex Samples General Linear Model procedure. Additional comparisons were considered statistically significant when 95% CIs did not overlap, a conservative approach because some overlapping CIs may be significant [21].

Effect size (ES) has been used as the measure of magnitude of effect because it is unknown whether the clinical minimally important difference specified for the AQoL-4D is applicable in population samples and across the adult life span [13]. This difference, assessed at 0.06, was based primarily on trials with older adults [22]. A modified form of Cohen *d* was calculated as an index of ES [23]; this used the SD of the reference category rather than an estimate pooling that of all groups [24]. The reference category was the first category, unless otherwise specified. ESs were classified as small (0.20), medium (0.50), and large (0.80) [23]. Comparisons against AQoL population norms used the Welsh approximate *t* test [25].

Results

Of the 1642 participants who met *ICD-10* criteria for a psychotic disorder at interview, 1613 (98.2%) provided sufficient data for AQoL utility assessment. Utilities ranged from −0.04 (n = 5 [0.3%]) to 1.00 (n = 41 [2.6%]). The mean AQoL utility was 0.49 (95% CI 0.48–0.51) with a median of 0.52 (IQR 0.26–0.73), significantly lower than the general population utility of 0.81 ($t = 42.75$; $df = 2129$).

The distribution of utilities by decade differed markedly from that of the general population (Fig. 1). Most strikingly, utilities for people with psychotic illness were almost uniformly distributed, whereas they were highly skewed toward the healthier decades for the general population. Almost half of the general population (47.2%) had a utility in the highest decade (>0.90 to 1.00), whereas for participants with psychosis, the highest decade had the lowest proportion of any decade at 6.8%.

Mean utilities were lower in people with a psychotic disorder in all age groups, and there was a greater decline in utility with increasing age for the psychosis sample than for the general population (Fig. 2). This divergence with age increased in the fourth and fifth decades of life.

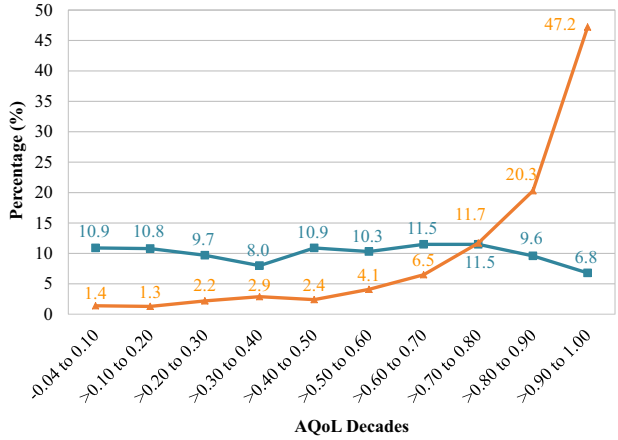

Fig. 1 – Distribution of utility scores for the Australian population with psychotic illness (Second Australian National Survey of Psychosis—Survey of High Impact Psychosis) and the general population by AQoL utility decade. *Note.* **General Australian population data were collected during the 2007 National Health and Mental Wellbeing Survey [13]. Teal squares: psychosis; orange triangles: general population. AQoL, Assessment of Quality of Life.**

With the exception of premorbid IQ, variations in demographic, cognitive, and functional variables were correlated with variations in estimated utility and demonstrated meaningful differences in utility, that is, greater than the minimally important difference of 0.06 (Table 1). The largest difference in utility between categories for these variables was 0.43 for global independent functioning, with utilities ranging from 0.72 (95% CI 0.68–0.77) for essentially normal functioning on the Multidimensional Scale of Independent Functioning to 0.29 (95% CI 0.23–0.35) for extremely disabled (ES −0.58 to −2.09). A large effect was also assessed for social functioning (ES −0.68 to −1.20) for which the maximum difference in utility between categories was 0.30.

All general health variables were correlated with variation in estimated utility (Table 1), with the variations all statisically and

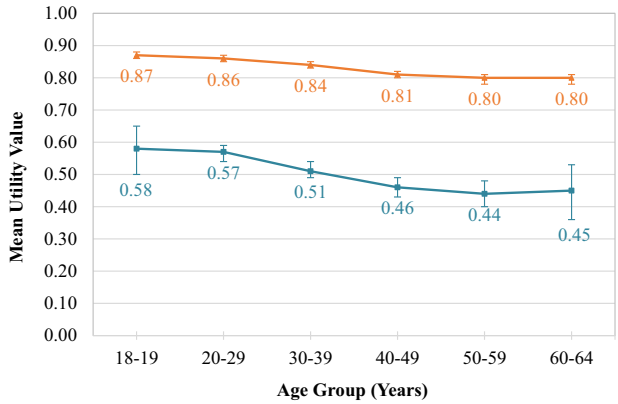

Fig. 2 – Mean AQoL utility scores with 95% CIs for the Australians with psychotic illness (Second Australian National Survey of Psychosis—Survey of High Impact Psychosis) and the general Australian population by age group. *Note.* **General Australian population data were collected during the 2007 National Health and Mental Wellbeing Survey [13]. Teal squares: psychosis; orange triangles: general population. AQoL, Assessment of Quality of Life; CI, confidence interval.**

Table 1 – AQoL utility scores by demographic, cognitive, functional, and general health variables.

Variable	n	Mean	SD	95% CI	Median	IQR	ES*	P value
Primary homelessness in last 12 mo†								0.002
No	1528	0.50	0.28	0.49–0.52	0.52	0.25–0.74		
Yes	85	0.40		0.34–0.46	0.36	0.15–0.59	−0.35	
Year 12 completion‡								0.001
Yes	517	0.54	0.28	0.51–0.57	0.57	0.29–0.77		
No	1077	0.47		0.46–0.49	0.48	0.22–0.71	−0.25	
Difficulty in reading and/or writing§								<0.001
No	1317	0.52	0.28	0.50–0.53	0.54	0.28–0.75		
Yes	293	0.39		0.36–0.43	0.33	0.13–0.64	−0.47	
Premorbid IQ‖								0.338
Above average	251	0.51	0.27	0.48–0.55	0.53	0.27–0.73		
Average	891	0.52		0.50–0.54	0.55	0.29–0.76	0.04	
Below average	236	0.49		0.45–0.53	0.51	0.23–0.73	−0.07	
Current cognitive function¶								<0.001
Above average	216	0.58	0.28	0.55–0.62	0.62	0.38–0.80		
Average	1018	0.52		0.50–0.54	0.54	0.28–0.74	−0.22	
Below average	207	0.41		0.55–0.62	0.37	0.12–0.64	−0.61	
Social functioning#			0.25					<0.001
No dysfunction	584	0.63		0.61–0.66	0.67	0.49–0.84		
Obvious dysfunction	700	0.46		0.44–0.48	0.47	0.26–0.67	−0.68	
Severe dysfunction	328	0.33		0.30–0.36	0.23	0.11–0.52	−1.20	
Global independent functioning**								<0.001
Essentially normal functioning	87	0.72	0.21	0.68–0.77	0.73	0.58–0.89		
Very mild disability	301	0.60		0.56–0.63	0.64	0.39–0.80	−0.58	
Somewhat disabled	413	0.52		0.50–0.55	0.55	0.31–0.74	−0.97	
Moderately disabled	446	0.45		0.42–0.48	0.46	0.19–0.69	−1.32	
Significantly disabled	269	0.41		0.38–0.45	0.38	0.18–0.63	−1.51	
Extremely disabled	79	0.29		0.23–0.35	0.22	0.10–0.49	−2.09	
Totally disabled	18	0.30		0.16–0.44	0.15	0.01–0.60	−2.05	
Perceived mental health††								<0.001
Excellent	167	0.67	0.28	0.62–0.72	0.75	0.47–0.91		
Very good	348	0.63		0.60–0.65	0.68	0.46–0.82	−0.14	
Good	531	0.49		0.46–0.51	0.51	0.25–0.71	−0.65	
Fair	395	0.40		0.38–0.43	0.41	0.18–0.61	−0.98	
Poor	118	0.22		0.18–0.26	0.17	0.06–0.33	−1.63	
Perceived physical health‡‡								<0.001
Excellent	96	0.64	0.28	0.58–0.70	0.70	0.36–0.89		
Very good	276	0.61		0.58–0.64	0.66	0.40–0.82	−0.11	
Good	560	0.55		0.52–0.57	0.58	0.33–0.75	−0.32	
Fair	463	0.43		0.40–0.46	0.43	0.19–0.65	−0.74	
Poor	214	0.30		0.26–0.34	0.25	0.06–0.47	−1.20	
Cardiovascular disease§§								<0.001
No	1419	0.52	0.28	0.50–0.53	0.54	0.28–0.75		
Yes	189	0.34		0.30–0.39	0.27	0.10–0.55	−0.65	
Depressive symptoms: lifetime‖‖								<0.001
No	331	0.57	0.29	0.53–0.60	0.62	0.31–0.82		
Yes	1282	0.48		0.46–0.49	0.49	0.24–0.71	−0.31	
Depressive symptoms: current¶¶								<0.001
No	1153	0.56	0.28	0.54–0.57	0.59	0.32–0.78		
Yes	460	0.34		0.32–0.36	0.32	0.12–0.53	−0.80	
CVD and depressive symptoms##								<0.001
Neither present	1025	0.57	0.27	0.56–0.59	0.61	0.36–0.80		
CVD only	124	0.41		0.35–0.46	0.33	0.15–0.67	−0.59	
Depressive symptoms only	394	0.36		0.34–0.39	0.34	0.15–0.55	−0.78	
CVD and depressive symptoms present	65	0.23		0.18–0.29	0.17	0.06–0.35	−1.26	

SD pertains to the reference category.

ANOVA, analysis of variance; AQoL, Assessment of Quality of Life; CI, confidence interval; CVD, cardiovascular disease; ES, effect size; IQ, intelligence quotient; IQR, interquartile range; SD, standard deviation.

* Modified Cohen *d*, with reference category as the first category.

† Primary homeless—sleeping rough in the past 12 mo. ANOVA, adjusted Wald $F = 9.934$; $df = 1, 1611$; $P = 0.002$.

‡ ANOVA, adjusted Wald $F = 12.622$; $df = 3, 1609$; $P = 0.001$ (included two missing categories).

§ ANOVA, adjusted Wald $F = 22.246$; $df = 1, 1610$; $P < 0.001$.

‖ ANOVA, adjusted Wald $F = 1.086$; $df = 2, 1375$; $P = 0.338$.

¶ ANOVA, adjusted Wald $F = 19.428$; $df = 2, 1438$; $P < 0.001$.

ANOVA, adjusted Wald $F = 135.824$; $df = 2, 1609$; $P < 0.001$.

** ANOVA, adjusted Wald $F = 37.373$; $df = 6, 1606$; $P < 0.001$.

†† ANOVA, adjusted Wald $F = 94.214$; $df = 4, 1554$; $P < 0.001$.

‡‡ ANOVA, adjusted Wald $F = 54.173$; $df = 4, 1604$; $P < 0.001$.

§§ ANOVA, adjusted Wald $F = 57.039$; $df = 1, 1606$; $P < 0.001$.

‖‖ ANOVA, adjusted Wald $F = 23.406$; $df = 1, 1611$; $P < 0.000$.

¶¶ ANOVA, adjusted Wald $F = 207.477$; $df = 1, 1611$; $P < 0.001$.

ANOVA, adjusted Wald $F = 93.837$; $df = 3, 1604$; $P < 0.001$.

meaningfully different. The largest effects were assessed for differences in perceived mental health (ES −0.14 to −1.63), the presence of lifetime CVD and/or current depressive symptoms (ES −0.59 to −1.26), and perceived physical health (ES −0.11 to −1.20). The difference in mean utility across the categories for each variable was 0.45, 0.34, and 0.34, respectively.

The concurrent consideration of current depressive symptoms and lifetime CVD suggested a cumulative effect. When neither condition was present, the mean utility was 0.57, but 0.41 in the presence of lifetime CVD alone, 0.36 for current depressive symptoms alone, and 0.23 when both conditions were present. Meanwhile, the mean utilities for current depressive symptoms and lifetime CVD when considered individually were comparable at 0.34 (95% CI 0.32–0.36) and 0.34 (95% CI 0.30–0.39), respectively, and no different from current depressive symptoms alone. Nevertheless, the corresponding ESs were large (ES −0.80), moderate (ES −0.65), and almost large (ES −0.78). Together these results support the sensitivity of the AQoL-4D in people with psychotic illness.

The sensitivity of the instrument was also reflected in the difference in utility between the "equivalent" categories for lifetime and current depression. For the presence of symptoms, the difference was 0.14, given mean utilities of 0.48 (95% CI 0.46–0.49) and 0.34 (95% CI 0.32–0.36), respectively, but only 0.01 for no symptoms, given mean utilities of 0.57 (95% CI 0.53–0.60) and 0.56 (95% CI 0.54–0.57), respectively.

All disease-specific variables were correlated with variation in estimated utility (Table 2), and the variations in utility were all statisically and meaningfully different at least between the highest and the lowest categories. For the major diagnostic groupings and relative to delusional disorders, only depressive psychosis had a large effect (ES −0.82), and schizoaffective disorders a small effect (ES −0.25). The mean utility for people with depressive psychosis at 0.32 (95% CI 0.26–0.39) was significantly and meaningfully lower than for the population with psychotic illness, whereas that for delusional disorders, at 0.55 (95% CI 0.49–0.61), was higher. Otherwise, there were clear effects for course and duration of illness, negative symptoms, co-occurrence of mania, positive and/or current depressive symptoms, and suicidal ideation (lifetime and current) on estimated utility.

The reduction in utility associated with increasing numbers of negative symptoms plateaued at about four symptoms with mean utilities of 0.40 (95% CI 0.36–0.43), 0.38 (95% CI 0.34–0.42), and 0.39 (95% CI 0.35–0.44) for four, five, and six symptoms, respectively. Cumulative effects were noted for the co-occurrence of mania and positive and/or current depressive symptoms. A negligible effect was assessed for mania alone (ES −0.15), an almost moderate effect for positive symptoms alone (ES −0.46), a moderate effect for mania and positive symptoms together (ES −0.62), and large effects for all other symptom categories, all of which included current depressive symptoms either alone or in combination with mania and/or positive symptoms. Utilities ranged from 0.62 (95% CI 0.60–0.64) for no symptoms to 0.29 (95% CI 0.24–0.34) for the presence of all three symptom groups (ES −1.27).

People with current (in the past 4 weeks) suicidal ideation had the lowest mean utility (0.24; 95% CI 0.17–0.30) among the disorder-related health measures. There was an approximately 0.20 difference in utility between the duration categories (actual attempt or at least 1 week, at least 2 weeks, and at least 1 month) for lifetime and current suicidal ideation except for the category "not present," for which the difference was not quite meaningfully different at 0.04.

There was no meaningful difference in utilities between those who had experienced lifetime suicidal ideation and those who had experienced lifetime depression. There were, however, meaningful differences in utility for those experiencing current depression and those experiencing current suicidal ideation of 2 weeks in the past month and for the past month, at 0.06 and 0.10, respectively.

Discussion

This study extends the assessments of the burden of psychotic disorders arising from the 2010 Australian National Survey of Psychosis [10,12,26], establishing the extent of HRQOL inequalities faced by people living with psychotic illness. In addition, we have established the robustness of AQoL-4D utilities in this population and provided a unique suite of utilities across a range of key objective and subjective general health and disease-specific measures, values that can be used in future economic modeling studies. The evidence also supports the use of these breakdowns in analyses for individual disorders except depressive psychosis and delusional disorders. We have also found that the AQoL-4D's clinical minimally important difference in utility of 0.06 is supported at the population level, because only differences of this magnitude had at least a small and statistically significant ES.

Psychotic illness was confirmed as having profound HRQOL impacts underpinned by a markedly different distribution of utilities to the general population. The mean utility of 0.49 equates to half the maximum utility of 1.00 (full health), and is consistent with the mean utility of 0.50 from the original validation study of the AQoL-4D in people with psychotic illness [9]. The Herrman et al. [9] study was undertaken in community-dwelling patients with a long-standing psychotic disorder who were attending an inner-city mental health service (N = 173).

The validity of the AQoL-4D is further highlighted when we compare our results with those obtained for other chronic health conditions. For example, the mean utility for persons with psychotic illness was significantly and meaningfully lower than for persons enrolled in chronic disease management programs (n = 1999) [27], both overall (0.55, SD = 0.32) and by age group (data not shown). Within this program the highest reported utility was for participants whose primary health condition was diabetes (without peripheral vascular complications) (0.62, SD = 0.31; n = 215), and it was the lowest in those with aged care and complex needs (0.33, SD = 0.25; n = 180). We found AQoL-4D utilities to be sensitive, associated with all but one objective and subjective general and disease-specific variable. Furthermore, there were differences in utility between variables (e.g., lifetime and current depression), between groups (e.g., *ICD-10* diagnoses), and variation across categories within a given variable. Cumulative effects were indicated for several variables including comorbid CVD and current depressve symptoms, co-occurring symptoms of mania, and positive and depressive symptoms. "Dose-response effects" were also observed within defined subgroups; floor effects, however, constrained some of these, such as that found when the number of negative symptoms reached four. These relationships have not been comprehensively demonstrated with other MAUIs [2,4].

Saarni et al. [2] (n = 267) found no significant association between utilities assessed using both 15D and EQ-5D and positive symptoms (–0.05; –0.13), disorganization (0.04; 0.14), and manic symptoms (0.05; 0.13) among individuals with a psychotic disorder. Nevertheless, significant but small associations were found for depressive symptoms (–0.17; –0.19), course of disorder (–0.25; –0.24), and outcome (–0.24; –0.21). Negative symptoms were not significantly associated with utility using the 15D, but were for the EQ-5D (–0.16; –0.25).

In the study by Roberts et al. [4] (n = 81), a lower mean utility was assessed for depressive conditions than for psychosis using

Table 2 – AQoL utility scores by disorder-related health measures.

Variable	n	Mean	SD	95% CI	Median	IQR	ES*	P value
Diagnosis: DIP *ICD-10*†								<0.001
Schizophrenia	838	0.51		0.49–0.53	0.53	0.26–0.74	−0.14	
Schizoaffective disorder	290	0.48		0.44–0.52	0.49	0.22–0.74	−0.25	
Bipolar disorder with psychotic features	316	0.51		0.47–0.54	0.52	0.26–0.73	−0.14	
Depressive psychosis	81	0.32		0.26–0.39	0.24	0.07–0.50	−0.82	
Delusional disorders	88	0.55	0.28	0.49–0.61	0.53	0.32–0.77		
Course of illness‡								<0.001
Single episode, good recovery	106	0.63	0.27	0.57–0.68	0.66	0.43–0.88		
Multiple episodes, good recovery	489	0.60		0.58–0.63	0.65	0.42–0.80	−0.07	
Multiple episodes, partial recovery	516	0.48		0.45–0.50	0.49	0.26–0.69	−0.52	
Continuous chronic	337	0.42		0.39–0.45	0.41	0.19–0.64	−0.77	
Continuous chronic with deterioration	165	0.32		0.28–0.37	0.22	0.11–0.56	−1.11	
Duration of illness§								<0.001
<1 y	34	0.63	0.27	0.52–0.73	0.68	0.39–0.87		
1 y	53	0.54		0.46–0.62	0.58	0.26–0.76	−0.34	
2–4 y	173	0.55		0.50–0.59	0.58	0.29–0.78	−0.30	
5–9 y	330	0.52		0.49–0.55	0.56	0.28–0.74	−0.41	
10–19 y	581	0.51		0.49–0.54	0.53	0.27–0.75	−0.45	
20–29 y	275	0.44		0.41–0.48	0.44	0.21–0.66	−0.71	
≥30 y	167	0.41		0.36–0.46	0.39	0.13–0.67	−0.82	
Negative symptoms‖								<0.001
0	228	0.70	0.22	0.67–0.73	0.74	0.58–0.86		
1	241	0.58		0.55–0.62	0.60	0.38–0.80	−0.55	
2	232	0.56		0.53–0.60	0.58	0.35–0.78	−0.65	
3	274	0.46		0.42–0.49	0.44	0.20–0.71	−1.11	
4	277	0.40		0.36–0.43	0.36	0.10–0.62	−1.38	
5	229	0.38		0.34–0.42	0.34	0.14–0.60	−1.48	
6	132	0.39		0.35–0.44	0.37	0.15–0.58	−1.43	
Current positive, mania, and depressive symptoms¶								<0.001
Not present	504	0.62	0.26	0.60–0.64	0.67	0.45–0.83		
Mania only	24	0.58		0.46–0.70	0.63	0.36–0.80	−0.15	
Positive symptoms only	577	0.50		0.48–0.53	0.52	0.26–0.74	−0.46	
Mania and positive symptoms	48	0.46		0.38–0.53	0.47	0.20–0.69	−0.62	
Depressive symptoms only	120	0.41		0.36–0.45	0.42	0.19–0.58	−0.81	
Mania and depressive symptoms	14	0.34		0.23–0.44	0.27	0.18–0.49	−1.08	
Positive and depressive symptoms	265	0.32		0.29–0.36	0.27	0.11–0.52	−1.16	
All symptoms present	61	0.29		0.24–0.34	0.24	0.12–0.44	−1.27	
Suicidal ideation: lifetime#								<0.001
Not present, ever	536	0.56	0.28	0.54–0.59	0.60	0.32–0.80		
At least 1 wk or attempted, ever	685	0.47		0.45–0.49	0.49	0.23–0.70	−0.32	
At least 2 wk, ever	105	0.48		0.43–0.54	0.55	0.26–0.71	−0.28	
At least 1 mo, ever	287	0.43		0.40–0.47	0.42	0.16–0.66	−0.46	
Suicidal ideation: current**								<0.001
Not present, past month	1428	0.52	0.28	0.51–0.54	0.55	0.29–0.75		
At least 1 wk or attempted, past month	114	0.29		0.25–0.34	0.24	0.09–0.47	−0.83	
At least 2 wk, past month	23	0.28		0.20–0.36	0.27	0.08–0.39	−0.86	
At least 1 mo, past month	48	0.24		0.17–0.30	0.15	0.08–0.35	−1.01	

SD pertains to the reference category.

ANOVA, analysis of variance; AQoL, Assessment of Quality of Life; CI, confidence interval; DIP, diagnostic interview for psychoses; ES, effect size; *ICD-10*, *International Classification of Diseases, Tenth Revision*; IQR, interquartile range; SD, standard deviation.

* Modified Cohen *d*, with reference category as the first category, except for diagnosis for which it is the last category.

† ANOVA, adjusted Wald $F = 8.246$; $df = 4, 1608$; $P < 0.001$.

‡ ANOVA, adjusted Wald $F = 43.360$; $df = 4, 1608$; $P < 0.001$.

§ ANOVA, adjusted Wald $F = 4.140$; $df = 6, 1606$; $P < 0.001$.

‖ ANOVA, adjusted Wald $F = 24.116$; $df = 6, 1606$; $P < 0.001$.

¶ ANOVA, adjusted Wald $F = 41.887$; $df = 7, 1605$; $P < 0.001$.

ANOVA, adjusted Wald $F = 13.931$; $df = 3, 1609$; $P < 0.001$.

** ANOVA, adjusted Wald $F = 58.600$; $df = 3, 1609$; $P < 0.001$.

both the SF-6D (mean utility 0.551 and 0.623, respectively) and the EQ-5D (mean utility 0.537 and 0.665, respectively). Psychosis was consequently assessed as having no significant independent effect on utility in regression analysis.

The lower assessed utilities for depressive conditions over psychosis (and other mental disorders) with the EQ-5D, 15D, and SF-6D are not surprising given that these instruments focus on physical health and largely or solely capture depressive symptoms as a proxy for the entire domain of mental health. Depressive symptoms are, however, identified as a major driver of poorer utility in the current analysis, and, of the major diagnostic categories, depressive psychosis had the lowest utility.

The cumulative effects indicated for comorbid CVD and current depressive symptoms are consistent with findings of additive effects for comorbid CVD and major depressive disorders with the AQoL-4D [28]. The assessed effect of CVD on HRQOL is also consistent with the literature on the effect of CVD on premature mortality in psychosis [29]. HRQOL (EQ-5D utilities) has been identified as an independent predictor of mortality in patients with type 2 diabetes [30]. Whether AQoL-4D utilities are a predictor of premature mortality in people with psychotic illness is worthy of future investigation.

The discriminatory abilities of the AQoL-4D are further reflected in the relatively flat, uniform distribution of utilities across the decades, the 10 HRQOL bands of the utility scale. In comparison, the EQ-5D has a highly negatively skewed distribution, and also has a ceiling effect (the assessment of a utility of 1.00) of about 20% in people with schizophrenia [3,31] compared with less than 3% in the present study.

The AQoL-4D is thus the first generic MAUI that can provide robust utility assessments in people with psychosis, which obviates the call for methods other than generic HRQOL instruments (MAUIs) to assess utility in people with psychosis [3]. Ascertaining the primary determinants of, and their relative contributions to, AQoL-4D utilities in individuals with psychotic illness will be a focus of future research.

Why the Superior Performance of the AQoL-4D in People with Psychotic Illness?

The AQoL-4D's assessment of health as a broader construct, which gives more weight to social disability than do other instruments used in this population [7], arguably underpins its superior performance. This hypothesis is consistent with social functioning being associated with a large ES in the present study. In contrast, the EQ-5D and 15D do not consider social relationships at all [8], whereas the SF-6D covers social functioning more generally, focusing on limitations in social activities (see Appendix 1 in Supplemental Materials).

The need for a broad construct for HRQOL in people with mental ill-health was foreshadowed at the outset of developments in quality-adjusted life-year assessment [32]. Among individuals with psychotic disorders, "well-being and ill-being," "control," "autonomy and choice," "self-perception," "belonging," "activity," "relationships," and "hope and hopelessness" have been identified as the domains of most importance in quality of life [33]. As such, measuring social disability is imperative in the assessment of HRQOL in psychotic disorders.

The importance of social disability is also reflected in the nomination of social isolation and loneliness as major challenges by 37.2% of respondents within the present survey [34]. Of all the MAUIs discussed, only the AQoL assesses loneliness, which may be a major factor underpinning its sensitivity in psychotic disorders.

The importance of social isolation as a determinant of HRQOL in severe mental illness is also consistent with the results of the AQoL psychosis validation study in which the social relationships dimension was ranked lower than other scored dimensions [9]. In contrast, psychological well-being was the lowest scored AQoL dimension in a study of individuals with major depression [35], suggesting that the determinants of quality of life may differ between psychotic and nonpsychotic disorders, and that the AQoL-4D is sufficiently sensitive to capture this. These findings highlight the importance of using a measure of HRQOL that comprehensively captures the varying dimensions affected by different disorders [36]—one cannot assess what is not captured.

It is acknowledged, however, that the AQoL-4D is the first and the simplest in the suite of AQoL instruments and does not assess all the domains identified by Connell et al. [33], for example, control. The most recent AQoL instrument, the 35-item AQoL-8D, is specifically designed to assess mental health problems [37], and in a comparison of six MAUIs—the AQoL-8D, 15D, SF-6D, five-level EQ-5D, Health Utilities Index-3, and Quality of Well-Being—the AQoL-8D was identified as the instrument of choice in conditions in which psychosocial domains are important [38]. The present analysis confirms that in the case of severe mental illness, the 12-item AQoL-4D is also preferred over instruments such as the EQ-5D, SF-6D, and 15D.

Because differences between MAUI utilities are "overwhelmingly attributable to instrument content and scale effects" rather than nationally derived algorithms [38], the results presented are believed to be generalizable beyond Australia.

Study Limitations

The study was confined to people in contact with public treatment services, and did not include data for those solely in the care of private providers or those in prisons, nursing homes, or out of contact with mental health care agencies. Utilities are likely to differ across such groups.

The AQoL-4D is validated for both self and interviewer administration, and was read to participants in this study. Nevertheless, there were more missing utility data for persons with reading and/or writing difficulties. Because reading and/or writing difficulties were associated with large ESs, the assessed utilities have likely been overestimated. The highest levels of missing data were for current cognitive functioning and premorbid IQ, which may also have led to overestimates.

Finally, published general population norms are likely to be slight overestimates of HRQOL, because of sampling and weighting procedures, including exclusion of those living in nonprivate dwellings, which would systematically exclude those with poor mental health living in supported accommodation or residential care facilities [13].

Conclusions

We have demonstrated that the AQoL-4D is the first MAUI to provide robust HRQOL assessments in psychotic disorders, and the assessed impacts are profound. The largest variations in utility were assessed for global independent functioning and perceived mental health. Of the major diagnostic categories, depressive psychosis had the lowest utility. The discriminant ability of the AQoL-4D in the population with psychosis supports the use of this instrument in the assessment of utility for economic evaluations, and we provide a suite of utilities that can be used in future economic modeling studies. As a consequence, interventions for people with psychotic illness can be assessed on an equivalent basis to interventions for all other conditions and diseases in resource allocation processes.

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Supplemental Materials

Supplemental material accompanying this article can be found in the online version as a hyperlink at https://doi.org/10.1016/j.jval.2018.02.012 or, if a hard copy of article, at www.valueinhealthjournal.com/issues (select volume, issue, and article).

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